

What is claimed is:

1. A lens for reading an original, comprising;  
five lenses as a whole including at least two positive  
and two negative lenses;  
5 an aspherical surface provided on at least one surface of said  
five lenses;  
four lens groups of five lenses which include a cemented lens  
constructed by cementing one of said positive lenses and one of said  
negative lenses; and  
10 an aperture stop disposed between the second and third groups;  
wherein  
said cemented lens is disposed adjacent to the aperture stop.
2. The lens according to claim 1, wherein a combined focal length  $f$   
15 with respect to an e line of an entire lens system, a focal length  $f_1$  with  
respect to an e line of a first lens counted from an object side, averages:  
 $n_{\text{正}}$  and  $n_{\text{负}}$  of positive and negative lenses in a refractive index with  
respect to a d line of a lens material, and averages:  $\nu_{\text{正}}$  and  $\nu_{\text{负}}$  of  
positive and negative lenses of an Abbe's number of a lens material  
20 satisfy following conditions:  
(1-1)  $0.3 < f_1 / f < 1.2$   
(2-1)  $-0.18 < n_{\text{正}} - n_{\text{负}} < 0.18$   
(3-1)  $0.88 < \nu_{\text{正}} - \nu_{\text{负}} < 35.0$
- 25 3. The lens according to claim 1, wherein said original reading lens  
comprises;  
first to fourth lens groups sequentially arranged from an object

side; wherein

the first lens group is composed of a first lens having a positive refracting power;

the second lens group is composed of a second lens having a  
5 negative refracting power;

the third lens group having a positive refracting power is composed of a cemented lens constructed by cementing third and fourth lenses;

the aperture stop is disposed between said second and third lens  
10 groups; and

the fourth lens group is composed of a fifth lens having a positive or a negative lens power.

4. The lens according to claim 3, wherein said third lens is a  
15 positive lens and said fourth lens is a negative lens, in the cemented lens which is constructed by the third and fourth lenses.

5. The lens according to claim 3, wherein said third lens is a  
negative lens and said fourth lens is a positive lens, in the cemented  
20 lens which is constructed by the third and fourth lenses.

6. The lens according to claim 1, wherein at least one surface of a first lens is said aspherical surface.

25 7. The lens according to claim 3, wherein said fifth lens is a negative lens.

8. The lens according to claim 3, wherein at least one surface of said first lens is an aspherical surface.

9 The lens according to claim 4, wherein at least one surface of a  
5 first lens is an aspherical surface.

10. The lens according to claim 5, wherein at least one surface of a first lens is an aspherical surface.

10 11. The lens according to claim 2, wherein said original reading lens comprises;

first to fourth lens groups sequentially arranged from an object side; wherein

the first lens group is composed of a first lens having a positive  
15 refracting power;

the second lens group is composed of a second lens having a negative refracting power;

an aperture stop is disposed between said second and third lens groups.

20 the third lens group having a positive refracting power is composed of a cemented lens constructed by cementing third and fourth lenses; and

the fourth lens group is composed of a fifth lens having a positive or a negative refracting power.

25

12. The lens according to claim 3, wherein a combined focal length  $f$  with respect to an  $e$  line of an entire lens system, a focal length  $f_1$  with

respect to an e line of a first lens counted from an object side, averages:  
 $n_{\text{D}}$  and  $n_{\text{F}}$  of positive and negative lenses in a refractive index with  
respect to a d line of a lens material, and averages:  $\nu_{\text{D}}$  and  $\nu_{\text{F}}$  of  
positive and negative lenses of an Abbe's number of a lens material

5 satisfy following conditions:

$$(1-2) \quad 0.40 < f_1 / f < 0.57$$

$$(2-2) \quad 0.08 < n_{\text{D}} \cdot n_{\text{F}} < 0.14$$

$$(3-2) \quad 3.47 < \nu_{\text{D}} \cdot \nu_{\text{F}} < 19.49$$

10 13. The lens according to claim 1, wherein said original reading lens  
comprises;

first to fourth lens groups sequentially arranged from an object  
side; wherein

the first lens group is composed of a first lens having a positive  
15 refracting power;

the second lens group having a negative refracting power is  
composed of the cemented lens constructed by cementing a second lens  
having a positive refracting power and a third lens having a negative  
refracting power;

20 the aperture stop is disposed between said second and third lens  
groups.

the third lens group is composed of a fourth lens having a  
negative refracting power; and

the fourth lens group is composed of a fifth lens having a  
25 positive refracting power.

14. The lens according to claim 13, wherein at least one surface of

said fourth lens is an aspherical surface.

15. The lens according to claim 13, wherein a combined focal length  $f$  with respect to an  $e$  line of an entire lens system, a focal length  $f_1$  with respect to an  $e$  line of a first lens counted from an object side, averages:  $n_{\text{正}}$  and  $n_{\text{负}}$  of positive and negative lenses in a refractive index with respect to a  $d$  line of a lens material, and averages:  $\nu_{\text{正}}$  and  $\nu_{\text{负}}$  of positive and negative lenses of an Abbe's number of a lens material satisfy following conditions:

- 10 (1-3)  $0.54 < f_1 / f < 1.14$   
(2-3)  $-0.16 < n_{\text{正}} - n_{\text{负}} < 0.05$   
(3-3)  $18.11 < \nu_{\text{正}} - \nu_{\text{负}} < 32.13$

16. The lens according to claim 15, wherein at least one surface of a fourth lens is an aspherical surface.

17. The lens according to claim 1, wherein said five lenses are all glass lenses, and said aspherical plane is formed by a glass mold.

20 18. The lens according to claim 17, at least one surface of a fourth lens is an aspherical surface.

19. A method for reading an original, comprising the steps of:  
preparing a lens for reading the original, including; five lenses as a whole including at least two positive and two negative lenses; an aspherical surface provided on at least one surface of said five lenses; four lens groups for five lenses which include a cemented lens

constructed by cementing one of said positive lenses and one of said negative lenses; an aperture stop disposed between the second and third lens groups; and said cemented lens being disposed adjacent to the aperture stop;

- 5        disposing the original on a contact glass in plane;  
         illuminating said original in a slit like shape;  
         imaging by reducing a reflected light from a portion illuminated  
         in the slit like shape on a line sensor by said original reading lens; and  
         reading an original image by illuminating and scanning a  
10        surface of said original with relatively displacing the illuminated  
         portion and the original in a direction perpendicular to a longitudinal  
         direction of said portion illuminated in the slit like shape.

20.    The method according to claim 19, wherein said method is  
15        constructed in such a manner that a degree of illumination in said  
         illuminated portion in the slit like shape in the original on said contact  
         glass increases from a center of the slit toward both end portions in a  
         longitudinal direction of the slit.

- 20    21.    A device for reading an original comprising;  
         an illumination system for illuminating an original;  
         an image-forming lens for reducing and imaging a light reflected  
         on the original illuminated by the illumination system;  
         a line sensor for conducting a photoelectric transfer of an  
25        original image imaged by the image-forming lens; and  
         said image-forming lens including;  
         five lenses as a whole including at least two positive and

two negative lenses;

an aspherical surface provided on at least one surface of said five lenses;

four lens groups for five lenses which include a cemented lens  
5 constructed by cementing one of said positive lenses and one of said negative lenses;

an aperture stop disposed between the second and third lens groups; and

said cemented lens being disposed adjacent to the aperture stop.

10

22. The device according to claim 21, wherein a component for decomposing a color to read the original image with a full-color is included on an optical path of an optical system.

15 23. An image forming apparatus for forming an image information as an image comprising;

a device for reading an original image in order to change the original image to the image information; and

said device for reading the original image including;

20 an illumination system for illuminating an original;

an image-forming lens for reducing and imaging a light reflected on the original illuminated by the illumination system;

a line sensor for conducting a photoelectric transfer of the original image imaged by the image-forming lens; and

25 said image-forming lens having;

five lenses as a whole including at least two positive and two negative lenses;

an aspherical surface provided on at least one surface of said five lenses;

four lens groups for five lenses which include a cemented lens constructed by cementing one of said positive lenses and one of said negative lenses;

an aperture stop disposed between the second and third lens groups; and

said cemented lens being disposed adjacent to the aperture stop.

24. An image forming apparatus for forming an image information as an image comprising;

a device for reading an original to read an original image in order to change the original image to the image information; and

said device for reading the original including;

an illumination system to illuminate the original;

an image-forming lens to reduce and image a light reflected on the original illuminated by the illumination system;

a line sensor to conduct a photoelectric transfer of the original image imaged by the image-forming lens; and

said image-forming lens having;

five lenses as a whole including at least two positive and two negative lenses;

an aspherical surface provided on at least one surface of said five lenses;

four lens groups for five lenses which include a cemented lens constructed by cementing one of said positive lenses and one of said negative lenses;

an aperture stop disposed between the second and third lens



groups; and

said cemented lens being disposed adjacent to the aperture stop;  
wherein

said device for reading the original includes a component for  
5 decomposing a color to read the original image with a full-color on an  
optical path of an optical system.

25. The apparatus according to claim 21, wherein a photosensitive  
media for forming an image by writing an image information with a  
10 light scanning is included.

26. The apparatus according to claim 22, wherein a photosensitive  
media for forming an image by writing an image information with a  
light scanning is included.

15

27. The apparatus according to claim 25, wherein as said  
photosensitive media, a photoconductive photoconductor is used so as to  
visualize an electrostatic latent image, which is written by the light  
scanning, with a prescribed color of a toner.

20

28. The apparatus according to claim 26, wherein as said  
photosensitive media, a photoconductive photoconductor is used so as to  
visualize an electrostatic latent image, which is written by the light  
scanning, with a prescribed color of a toner.